



# **Standardized Process for the Development of Military-Unique Emissions Factors**

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2011 Environmental Monitoring and Data Quality Workshop  
Quality Assurance Sessions  
31 March 2011

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE <b>31 MAR 2011</b>		2. REPORT TYPE		3. DATES COVERED <b>00-00-2011 to 00-00-2011</b>	
4. TITLE AND SUBTITLE <b>Standardized Process for the Development of Military-Unique Emissions Factors</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>Naval Sea Systems Command,Naval Ordnance Safety &amp; Security Activity,23 Strauss Avenue,Indian Head,MD,20640</b>				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>					
13. SUPPLEMENTARY NOTES <b>Presented at the 2011 DoD Environmental Monitoring &amp; Data Quality Workshop (EMDQ 2011), 28 Mar ? 1 Apr, Arlington, VA.</b>					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>Same as Report (SAR)</b>	18. NUMBER OF PAGES <b>15</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			

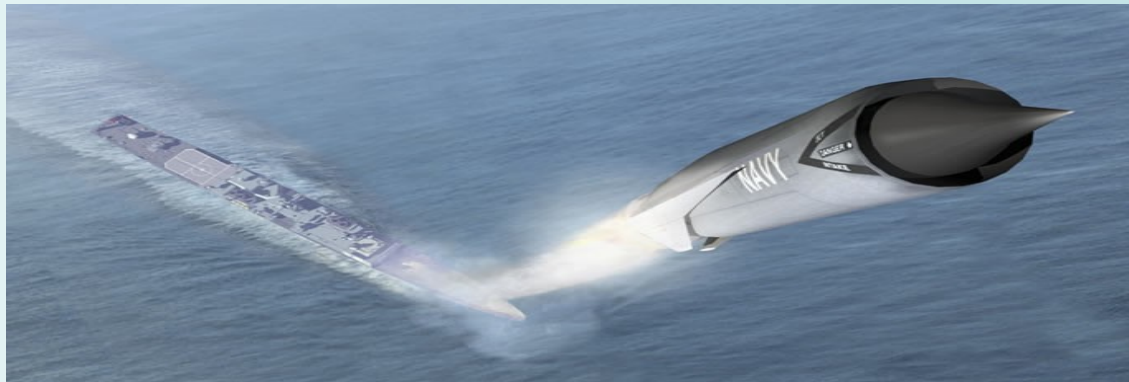
# What are Air Emissions?

- **Air emissions:** Gases & particles released from a source into the air
- **“Criteria Pollutants”:** Harmful to human health & the environment
  - lead (Pb)
  - particulate matter (PM)
  - carbon monoxide (CO)
  - nitrogen dioxide (NO<sub>2</sub>)
  - ozone (O<sub>3</sub>)
  - sulfur dioxide (SO<sub>2</sub>)
- **Hazardous Air Pollutants (HAPs),** EPA list (187 pollutants) known or suspected to cause cancer or other serious health effects (e.g. reproductive effects, birth defects)



# What are Emissions Factors (EFs)?

- Value used to estimate quantity of substance released to the atmosphere
- Determined by instrumental measurements
- Available data/measurement accuracy affects EF certainty
- More certainty provides greater confidence in estimating releases
- Developed for preparing regional & national emissions inventories
- AP 42, Fifth Edition *Compilation of Air Pollutant Emissions Factors, Volume 1: Stationary Point and Area Sources* – current EPA EF database





# Chapters in AP 42, Volume I, Fifth Edition

Chapter 1	<b>External Combustion Sources</b>
Chapter 2	<b>Solid Waste Disposal</b>
Chapter 3	<b>Stationary Internal Combustion Sources</b>
Chapter 4	<b>Evaporation Loss Sources</b>
Chapter 5	<b>Petroleum Industry</b>
Chapter 6	<b>Organic Chemical Process Industry</b>
Chapter 7	<b>Liquid Storage Tanks</b>
Chapter 8	<b>Inorganic Chemical Industry</b>
Chapter 9	<b>Food and Agricultural Industries</b>
Chapter 10	<b>Wood Products Industry</b>
Chapter 11	<b>Mineral Products Industry</b>
Chapter 12	<b>Metallurgical Industry</b>
Chapter 13	<b>Miscellaneous Sources</b>
Chapter 14	<b>Greenhouse Gas Biogenic Sources</b>
Chapter 15	<b>Ordnance Detonation</b>

<http://www.epa.gov/ttnchie1/ap42/>

# Emissions Factors (EFs) & AP 42

- **EPA EF development guidance: Procedures for Preparing EF Documents, EPA-454/R-95-015, Nov 97**
  - EFs submitted with test methods
  - EFs rated "A" thru "E" — Assess factors representing emissions sources
  - On EPA public Web site for public review and comment
- **EF applications expanded to:**
  - Develop site-specific emissions estimates
  - Determine permit and regulatory requirement applicability
  - Conduct risk assessments
  - Demonstrate compliance
  - Establish permit limits
  - Report Toxic Release Inventory



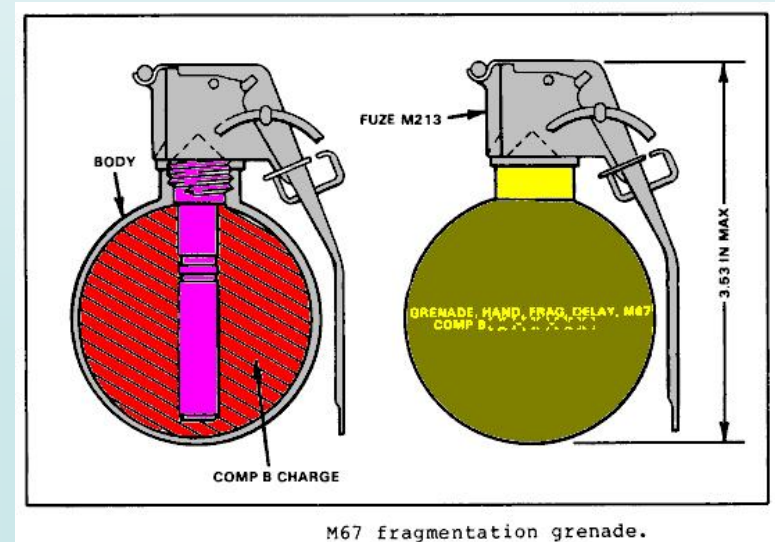
# Examples of Military EFs & Emissions Estimates

$$E = EF \times A$$

emission = emission factor X activity

	lb per item (Rating C)	lb emissions from 1000 grenades
CO	1.7E-02	17
Pb	5.0E-04	0.5
NOx	1.1E-03	1.1
PM-10	3.1E-02	31

AP 42, Fifth Edition, Volume I Chapter 15:  
Ordnance Detonation Section 15.5 Grenades



M67 Fragmentation Hand Grenade

# Examples of Military EFs & Emissions Estimates



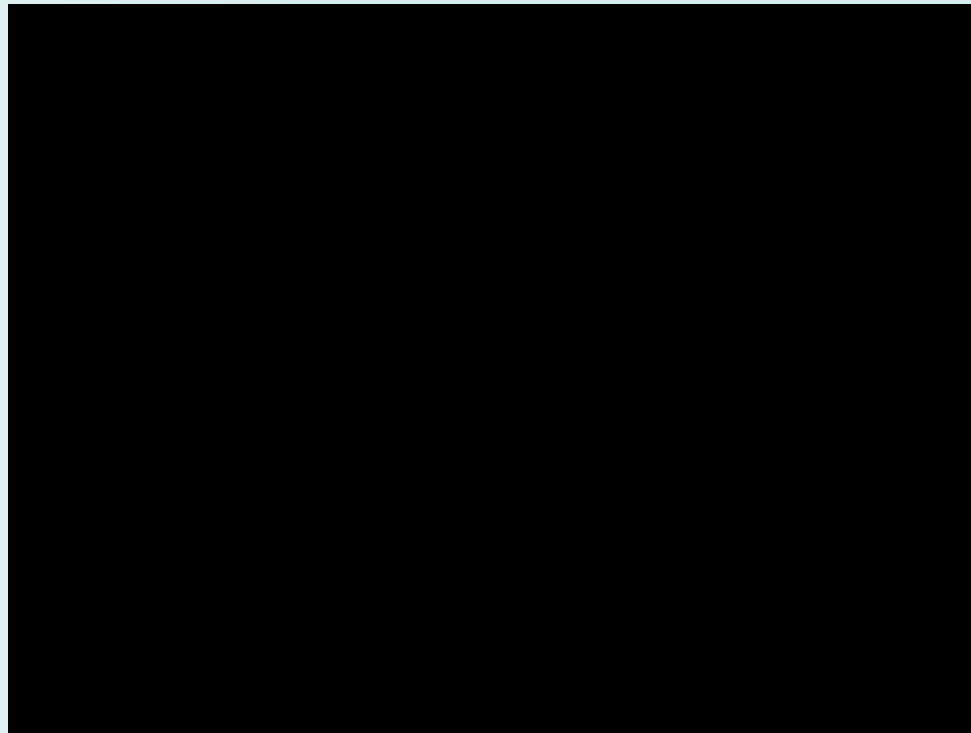
MK66 Mod 3 Motor

Pollutant	EF (lb/lb NEW)	Quality Rating	lb pollutant per rocket fired	Motors fired to achieve 1 lb pollutant
Lead	9.7E-03	C	.070	15
PM-10	2.3E-02	B	0.16	6
Benzene	5.2E-05	C	3.6E-04	2,800
Naphthalene	1.2E-06	C	8.6E-06	120,000



# Examples of Military EFs & Emissions Estimates

- **Military waste munitions disposal permits:** require air pathway risk assessments
- **Hazard Risk Assessment (HRA)** — Used to assess risk to human health & the environment



*Video clip buried detonation  
plays in slide show mode*

# DoD Emissions Factors (EFs) Development Process

- **All-Service management of DOD-developed EF data used to estimate military mission-related air pollutant releases**
  - Review data before release to the public
  - Internal DoD peer review
    - measurement methods
    - test descriptions
    - data quality
    - suitability for publication
    - applicability for DoD use
- **Clean Air Act Services Steering Committee coordination ensures all-Service representation & consistency**
  - Environmental Data Quality Workgroup available to help resolve issues



# Motivation to improve EPA's Emissions Factors (EFs) Program

- ***EPA Should Improve Oversight of Emissions Reporting by Large Facilities***, April 2001 GAO Report (GAO-01-46)
- ***EPA Can Improve Emissions Factors Development and Management*** March 2006 EPA IG Report No. 2006-P-00017
- **EPA solicited comments on how to improve its EF development program**, 14 October 2009, (74 FR 52723)
  - Sustainable program producing high quality EFs
  - Provide quantitative precision & accuracy
  - Encourage the appropriate use of EFs
  - Better define public participation



# DoD Comments on EPA Advanced Notice of Proposed Rulemaking (ANPRM)

- Need a simple, easy-to-use, clearly defined process
- Endorsed timely public review to allow feedback & information exchange
- Expand EF use for purposes other than preparing emissions inventory
- Recommended using standard data analysis for EF precision & accuracy
- Concurred with establishing a Web-based standardized process
- Recommended using experimental/modeled EFs when direct site-specific measurements are not feasible or produce unreliable results



# EPA Draft Emissions Factors (EFs) Development Process

- **Recommended Procedures for Developing EFs**
  - Emphasis on stationary sources
  - Use WebFIRE interactive EF database to calculate EFs
    - Electronic Reporting Tool for submissions of emissions test data
    - Allows generating both “EPA Developed” and “User Defined” EFs
    - Quality rating system based on a Test Report Quality Ranking Tool
  - Third Party (state regulator) review is included in quality rating
- **Finalized guidance will supersede previous EPA EF development guidance, EPA-454/R-95-015, Nov 1997**





# DoD Comments on EPA Draft Emissions Factors (EFs) Development Process

- **Concern Quality Ranking Tool doesn't improve data quality**
  - Only improves reliability and completeness of the test report
  - Numerous concerns with the checklist
  - Experimental uncertainty, 1<sup>o</sup> factor in ranking EF quality not properly addressed
  - Recommendations/disagreement on approach to outliers, non-detects & data combinations
- **Questions on WebFIRE's incorporation of AP 42**
- **Protection of Confidential Business Information**
- **Using WebFIRE for non-inventory purposes**



# Summary

- **Need method to accurately estimate air pollutant emissions for DoD-unique processes & ops**
- **AP 42 is EPA's existing public compilation of EFs**
  - Background document providing test methods
  - Data quality rating are qualitative
- **DoD developing process for all-Services peer review of military- unique EFs for public release**
- **EPA developing improved EF process & data management plan**
- **EPA published a draft EF reporting proposal**
  - New Web-based process with data quality ranking
  - state regulator input to final quality ranking score
- **DoD comments to EPA: some progress but data quality analysis & rating system need improvement**

# Questions?

